The Relationship between Financial Development, Human Capital Development and Economic Growth in Sri Lanka

Jahfer.A[1] and Abdul Rauf. F. H[2]

1 Department of Accountancy and Finance, Faculty of Management and Commerce, South Eastern University of Sri Lanka, Oluvil, Sri Lanka.

2 Department of Management, Faculty of Management and Commerce, South Eastern University of Sri Lanka, Oluvil, Sri Lanka.

Abstract

This paper examined the relationship between the financial development, Human Capital Development investment and economic growth in Sri Lanka using annual data over the period 1961 to 2015. Johansen Co-integration Technique and Vector Error Correction Model were used to investigate the relationships. The results demonstrated that there is a long-run equilibrium relationship. Further, human capital development and financial development causes economic growth. And economic growth causes human capital development. But no strong evidence that financial development causes human capital development Moreover, findings concludes that human capital development and financial development are matter for the economic growth of Sri Lanka.

Keywords: Financial Development, Human Capital Development, Economic Growth, Sri Lanka

Introduction

Even though the relationship between financial development and economic growth has been comprehensively in the theoretical and empirical literature, specific studies addressing the links between financial development, human capital development and economic growth are very scant in Sri Lanka. The study on the relationship between financial development and economic growth goes back to the work of Schumpeter (1911). The endogenous growth literature (Lucas, 1988; Greenwood & Jovanovic, 1990; Bencivenga & Smith, 1991) stressed that financial development is an important factor for the long run economic growth. There are many studies such as Riley(2012), Lucas (1988), Mankiw et al., (1992), De la Fuente & Doménech (2000); (2006), that revealed that one of the most important factors of economic growth is human capital with regard to both the effect of level (so called level effect) by its decisive influence on production through labor productivity and the rate effect by contributing to increased competitive advantage through innovation and diffusion technology (Pistorius, 2004; Siggel, 2000; 2001; Horwitz, 2005).

In the classical theory of economic growth, labor productivity is regarded as an exogenous factor which depends on the ratio between workforce and physical capital, plus other factors (technical progress), but the beneficial effect of education on potential growth of productivity is not taken into calculation. Bundell et.al. (1999) analyzing the impact of human capital on economic growth believe that the growth rate of output depends on the rate of accumulation of human capital and innovation, whose source is the stock of human capital, education level influence labor productivity.

Financial development and economic growth is largely based on the endogenous growth models, however, it has neglected human capital accumulation as an important channel through which financial development can influence output in the context of the endogenous growth models. In some of the few exceptions to this, Evans, Green and Murinde (2000) assess whether the development of the financial sector and human capital, favorably impacted economic growth in 82 countries. The findings show that both are making important contribution towards the economic growth. They therefore, argued that testing the impact of either of them separately will tend to yield misleading results. Therefore, the objective of this study is to analyze the relationship between financial development, human capital development and economic growth in Sri Lanka.

Literature Review

The contribution of the financial markets to growth has received considerable attention with the emergence of the endogenous growth theory. Cross-country studies (Roubini & Sala-l-Martin, 1992; Easterly, 1993; De Gregorio & Guidotti, 1995; Khan & Senhadji, 2003; Andersen & Tarp, 2003) lend credence to financial development having a positive effect on long-run economic growth. Further, Levine and Zervos (1998); Beck et. al. (2000); Rajan and Zingales (2001) gave empirical evidence supporting the hypothesis that financial development enhances economic growth.

Ahmed and Ansari (1998) investigated the relationship between financial sector development and economic growth for three South-Asian economics, namely, India, Pakistan, and Sri Lanka using standard Granger causality tests and Cobb-Douglas production function framework and concluded that financial development causes economic growth. Demetriades and Hussein (1996) show that, Sri Lanka's economic growth causes financial development and to a lesser extent, financial development leads to its economic growth. Macri and Sinha (2001), using multivariate causality tests on first differenced variables which are stationary, suggest that there is hardly any evidence of causality between financial development and economic growth in any direction for Sri Lanka. Abma and Fase (2003) have investigated how the financial intermediation matters for growth for 9 selected Asian countries using Granger causality test and regression analysis. They have found non-significant relationship between finance and growth for Sri Lanka. Hemachandra (2005) concludes that banking sector financial deepening has had positive implications on the growth of the Sri Lankan economy.

Data and Methodology

In this study, we use annual data for the Sri Lanka economy for the period 1961to 2015 and collected mainly from International Financial Statistics (IFS-2014) published by the International Monetary Fund and the reports of central bank of Sri Lanka. Following common practice in the literature, we employ two commonly used measures of financial development in order to see the association of financial development with economic growth and, further, to examine the sensitivity of the results. First one is the domestic credit to nominal GDP (DC). This measure has been used extensively in numerous works (Beck, Levine, & Loayza, 2000; Demetriades & Hussein, 1996; King & Levine, 1993 among others). Calderon and Liu (2003) suggest that this indicator has an advantage as it takes into account the credits to private sector only and isolates the credits channeled to public sector and credits from central bank. We feel that this measure is much relevant proxy for financial market development of Sri Lanka, since it is one of the developing countries. Second measure we use money supply (BM), represents ratio of money supply (BM) to nominal GDP. Because, in developing countries, a large part of BM stock consists of currency held outside banks. As such, an increase in the M2/GDP ratio may reflect an extensive use of currency rather than an increase in bank deposits, and for this reason this measure is less indicative of the degree of financial intermediation by banking institutions. An increase in M2/GDP may also indicate a capital flight out of a country, therefore negatively affecting economic growth. This measure had been used by King and Levine, 1993, Demetriades and Hussein. 1996; and Abu-Bader and Abu-Qarn, 2008.

Economic growth is measured by the change in real gross domestic product (GDP) (Constant 2005). Human capital development is measured by secondary school enrolment rate and public expenditure on education to GDP.

Empirical model specification
In order to investigate the effect of financial development (FD) and human capital development (FDI) on economic growth (GDP), co-integration test and Vector Error Correction Model (VECM) are applied. Since macroeconomic time series data contain unit root, variables used in the study are tested for stationary before running causality tests. For this purpose, unit roots are tested using Augmented Dickey-Fuller (1979) test.

After confirming that the variables are integrated of order one, then it is tested the existence of co-integration relationship between the variables. The co-integration tests were done among the variables using the Johansen (1998) co-integration tests. Since Johansen co-integration is sensitive to the lag length, we used Schwarz Information Criterion to determine the appropriate number of lag.

If co-integration detected between variables, then it is known that there exists a long term equilibrium relationship between them. So, we can estimate VECM with variables. The equation forms for VECM are as follows. To test whether financial development and human capital development granger-causes economic growth, the following VECM is estimated.

$$\Delta GDP_t = \lambda_{10} + \sum_{i=1}^{n} \lambda_{11i} \Delta GDP_{t-i} + \sum_{i=1}^{n} \lambda_{12i} \Delta HD_{t-i} + \sum_{i=1}^{n} \lambda_{13i} \Delta FD_{t-i} + \lambda_{14} ECT_{t-1} + \mu_t$$

(1)

In order to investigate opposite hypothesis that economic growth and human capital development granger-causes the financial development following equations is estimated

$$\Delta FD_t = \lambda_{20} + \sum_{i=1}^{n} \lambda_{21i} \Delta FD_{t-i} + \sum_{i=1}^{n} \lambda_{22i} \Delta HD_{t-i} + \sum_{i=1}^{n} \lambda_{23i} \Delta GDP_{t-i} + \lambda_{24} ECT_{t-1} + \mu_t$$

(2)

In the same way to investigate the hypothesis that economic growth and the financial development granger-causes human capital development following equations is estimated

$$\Delta HD_t = \lambda_{30} + \sum_{i=1}^{n} \lambda_{31i} \Delta HD_{t-i} + \sum_{i=1}^{n} \lambda_{32i} \Delta FD_{t-i} + \sum_{i=1}^{n} \lambda_{33i} \Delta GDP_{t-i} + \lambda_{34} ECT_{t-1} + \mu_t$$

(3)

where ECT_{t-1} is the lagged value of the error correction term, μ_t is white noise error terms, $\triangle$ is the first-difference of the variable, GDP is the change in real GDP, HD is the human capital development, FD is the financial development.

Unit Root Test
As a first step, to check the stationarity of the variables, the Augmented Dickey-Fuller (ADF) test was employed. The test is conducted with intercept only and intercept and trend respectively on the level and first differences of the variables. The results of ADF test are given in Table 1. However, all variables are stationary on first differencing. Thus variables are stationary and integrated of same order I (1).

Table 1: Augmented Dickey-Fuller (ADF) Unit Root Test Results

Variables	Level		First Difference		Number of observations (After adjustments)
	Test with Intercept	Test with Trend and Intercept	Test with Intercept	Test with Trend and Intercept	
GDPPC	5.3947*	0.833	-4.3072***	-5.894***	54
DC/GDP	-2.4272	-3.0525	-7.74415***	-7.6822***	53
BM/GDP	-1.2611	-2.425	-6.652336***	-6.58699***	53
GOVEX/ GDP	- 1.242	-7.605***	-5.331***	-5.894***	32
SES	-1.1923	-1.6022	-2.3697	-4.85251***	32

Notes: ***, **, * indicates significance at the 1%, 5% and 10% level respectively. Critical values with intercept and trend and intercept are for all tests are -3.546, -2.912, -2.594 and -4.121, -3.488, -3.172 at the 1%, 5% and 10% levels of significance in that order. The numbers within bracket indicates number of lags which are selected based Schwarz information criterion

Co-integration Tests

Having confirmed that all variable are integrated of order (1), the co-integration tests were done among the variables using the Johansen's co-integration tests to investigate long-term equilibrium relationship among the variables. Number of lags is selected using an optimal lag structure in the unrestricted VAR. Johansen's approach derives two likelihood estimators for the co-integration rank: a trace test and a maximum Eigen value test. Table 2 presents summarized co-integration results between the variables. Co-integration results indicate the existence of long-run association between financial development, human capital development and economic growth in Sri Lanka. Therefore, VECM can be used to investigate the relationships among the selected variables.

Table 2: Johansen Co-integration Test Results: Financial development, Human Capital Development and Economic Growth

Hypothesized No. of CE(s)	Trace Test			Maximum Eigenvalue Test		
	Test Statistic	Critical Value5%	Prob.**	Test Statistic	Critical Value5%	Prob.**
i. GDPPC, BM and SES						
None *	28.71509	29.79707	0.0662	26.15437	21.13162	0.0090
At most 1	2.560724	15.49471	0.9832	1.866557	14.26460	0.9934
At most 2	0.694167	3.841466	0.4047	0.694167	3.841466	0.4047
ii. GDPPC, BM and GOVEX						
None *	23.85682	29.79707	0.2066	12.61957	21.13162	0.4878
At most 1	11.23725	15.49471	0.1973	10.69672	14.26460	0.1701
At most 2	0.540531	3.841466	0.4622	0.540531	3.841466	0.4622
iii. GDPPC,DC and SES						
None *	30.36055	29.79707	0.0430	22.58974	21.13162	0.0310
At most 1	7.770814	15.49471	0.4902	5.544764	14.26460	0.6721
At most 2	2.226049	3.841466	0.1357	2.226049	3.841466	0.1357
iv. GDPPC, DC and GOVEX						
None *	24.07587	29.79707	0.1973	15.09992	21.13162	0.2820
At most 1	8.975944	15.49471	0.3676	8.964245	14.26460	0.2891
At most 2	0.011699	3.841466	0.9136	0.011699	3.841466	0.9136

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Vector Error Correction Model

Since the variables are co-integrated, there are long term relationships among the variables under consideration. Table 3 presents summary results of Vector Error Correction Model with respect to GDP, HD, and FD under the three models. The estimated error correction terms (ECT) are negative and highly significant in model 1 and 3. These results are supporting the co-integration among the variables represented by model. However, in model 2, the estimated error correction term (ECT) is negative and significant when we use DC as a proxy for financial development only.

Table 3:Results of Vector Error Correction Model

Model 1: Dependent variable - GDPPC

	GDPPC(-1)	BM(-1)	SES(-1)	ECT
GDPPC, BM, SES	1.000	-0.0095	-0.0832	-0.01102
	-	(4.997)***	(-19.326)***	(-3.704)***
	GDPPC(-1)	BM(-1)	GOVEX(-1)	ECT
GDPPC, BM, GOVEX	1.000	-0.349892	0.8458	-0.00899
	-	(3.51327)**	(0.97611)	(-2.584)***
	GDPPC(-1)	DC(-1)	SES(-1)	ECT
GDPPC, DC, SES	1.000	-0.003811	-0.008376	-0.1047
	-	(-5.04624)***	(-15.312)***	(-1.492)
	GDPPC(-1)	DC(-1)	GOVEX(-1)	ECT
GDPPC, DC, GOVEX	1.000	-0.1349	-1.651	-0.001
	-	(-4.43038)***	(-2.5461)*	(-2.611)***

Model 2: Dependent variable - Financial Development

	BM (-1)	GDPPC (-1)	SES(-1)	ECT
BM,GDPPC, SES	1.000	-94.56859	0.933363	0.032447
		(-3.20077)***	(3.15673)***	(0.15856)
	BM (-1)	GDPPC (-1)	GOVEX(-1)	ECT
BM, GDPPC, GOVEX	1.000	-2.858022	-2.417597	-0.12202
	-	(-0.62678)	(-0.91657)	(-0.4650)
	DC (-1)	GDPPC (-1)	SES(-1)	ECT
DC,GDPPC, SES	1.000	-2.6238	2.11961	-0.4215
		(-6.6346)***	(-5.1312)***	(-2.7264)**
	DC (-1)	GDPPC (-1)	GOVEX(-1)	ECT
DC, GDPPC, GOVEX	1.000	7.45363	12.309	-0.52022
		(1.0165)	(-2.55028)**	(-0.9838)

Model-3: Dependent variable -Human Capital Development

	SES (-1)	BM(-1)	GDPPC (-1)	ECT
SES,GDPPC, BM	1.000	1.07139	-10.13203	-0.23211
	-	(1.4438)	(-5.28113)***	(-2.294)**
	GOVEX (-1)	**BM(-1)**	**GDPPC (-1)**	**ECT**
GOVEX ,GDPPC, BM	1.000	-0.413634	1.182175	- 0.24296
	-	(-2.32037)**	(0.44085)	(-2.695)**
	SES (-1)	**DC(-1)**	**GDPPC (-1)**	**ECT**
SES ,GDPPC, DC	1.000	-0.4717	-12.3876	-0.11138
	-	(-4.8594)***	(-19.0479)***	(-1. 2535)
	GOVEX (-1)	**DC(-1)**	**GDPPC (-1)**	**ECT**
GOVEX, GDPPC, DC	1.000	0.081241	0.605543	-0.55949
	-	(4.5652)***	(1.04468)	(-2.161)**

Note: **, *** indicate significance at 1% and 5% levels respectively. The t-values are in parenthesis.

According to the VECM results, coefficients of financial development proxies are major interest. In model 1, coefficient of broad money (BM) is 0.0095 and significant at the 1 percent level. This magnitude implies that 1 percent increase of broad money will increase GDP by 9 percent in the long run. Coefficient of secondary school enrolment rate is 0.08, which is significant at the 5 percent level. This magnitude implies that 1 percent increase in quasi money will increase GDP by 8 percent in the long run. When we use total government expenditure to GDP as a measure of human capital development and domestic credit to GDP as a measure of financial measure, the both coefficients are significant and have a positive effect on economic growth of the country.

According to the Model 2, error correction term is significant and negative only with DC and GDPPC. It is observed significant results that economic growth and human capital growth causes the financial development in one equation. In the Model 3, error correction term is significant and negative except DC as financial development measure and GDPPC. Others are significant. It reveals that economic growth and financial market development causes the human capital development. In sum, the results demonstrate strong evidence that there is human capital development and financial development causes the economic growth and vice versa, but no strong evidence that human capital development cause financial development. Hence, the results reveal that financial development and human capital development are matter for economic growth of Sri Lanka.

Summary and Conclusion

This study investigates the impact of the financial development and human capital development on economic growth in Sri Lanka using annual data over the period 1961 to

2015. The stationary of the data are tested using Augmented Dickey Fuller (ADF) test. Johansen co-integration technique and the Vector Error Correction Model (VECM) are used to estimate the effect of financial development, human capital development on economic growth. Two different measures of financial development (BM/GD and DC/GDP) are used in this study. Human capital development is also measured using government expenditure to GDP and secondary enrolment school.

Johansen co-integration test finds that financial development, human capital development and economic growth are co-integrated. VECM results demonstrate that there is a long-run equilibrium relationship and that financial development and human capital development causes the economic growth. Further, financial development causes human capital development, but no strong evidence that human capital causes financial development Sri Lanka.

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